

EAVP

easy
intelligent
driverless



EUROPEAN AUTOMATED VALET PARKING

AUTOMATED VALET PARKING USER JOURNEY

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TABLE OF CONTENTS

TABLE OF CONTENTS	3
LIST OF FIGURES	4
ABBREVIATIONS	5
VERSIONS.....	6
BACKGROUND	7
INTENDED AUDIENCE.....	8
1. EXECUTIVE SUMMARY	9
2. DEFINITIONS	10
3. USER STORY AVP ₂ – PURELY USER PERSPECTIVE.....	11
3.1. Set-up.....	11
3.2. Before & While Driving	11
3.3. Arriving (at target AVP-capable parking lot)	11
3.4. Start Transaction	12
3.5. While Transaction	12
3.6. Stop Transaction.....	13
3.7. Billing & Service Information.....	13
3.8. User Loyalty	13
FOR REFERENCE/INFORMATION	14

LIST OF FIGURES

Figure 1: AVP User Journey 9

ABBREVIATIONS

Abbreviation	Definition
AVP	Automated Valet Parking
EAVP	European Automated Valet Parking (ERTICO innovation platform)

VERSIONS

Version	Date	Topic	Author
1.0	2023-05-10	Released version by EAVP	Sarah Stahl (BMW), Simone Frank (BMW), Markus Schneider (EPA), Theo Thuis (EPA), Johannes Ruopp, Robert Exler (Bosch), Peter Thoenissen(BMW), Tim von Törne (Kopernikus), Frank Daems (ERTICO)

BACKGROUND

EAVP, the European Automation Valet Parking platform, is an ERTICO innovation platform with the aim to establish earliest an AVP eco system, defining and describing the interfaces between the various AVP system contributions by the stakeholders, ensuring a seamless customer process, fulfilling the expected user requirements.

Automated Valet Parking (hereinafter “AVP”) is an automated vehicle parking system. It is designed to remove off-street parking hassle whereby the vehicle driver can leave his AVP vehicle and the vehicle moves autonomously through the parking area into the parking lot. The same holds for the pick-up of the AVP vehicle. AVP is considered as a significant step forward in the automated driving journey. AVP holds benefits for the driver, the parking operator and the wider community (e.g. customer comfort, safety, space optimization, automated charging and other services).

The European Automobile Manufacturers’ Association (“ACEA”) and the European Association of Automotive Suppliers (“CLEPA”) have been approached by some of their members to facilitate the administrative and project process for the sourcing of a common market study at a 3rd party consulting company to contextualize AVP in terms of market potential and associated conditions. This study was performed in 2020/2021 by PwC and evaluated the market interest for AVP, an assessment of market attractiveness/technology scenarios/legal frameworks and potentially interested investors/ partners in the parking industry that can serve as an overarching basis to organize the deployment.

EAVP establishes a multi stakeholder innovation platform and to create an activity by aligning all stakeholders and define, develop, and market the relevant building initiatives.

INTENDED AUDIENCE

This document addresses the EAVP professional stake holders.

- Parking infrastructure providers
- Parking operators
- AVP operators
- AVP equipment providers
- OEMS
- OEM Tier 1 and 2 suppliers
- Telecom operator
- ICT (Information and Communication Technology) industry representatives
- Member state and city authorities
- EU commission and regulatory instances
- Professional press

1. EXECUTIVE SUMMARY

This document specifies the user story for the process of automated valet parking broken down into 8 Steps as outline in the ERTICO meeting and summarized in the following overview:

AVP - CUSTOMER JOURNEY AT A GLANCE.



Figure 1: AVP User Journey

2. DEFINITIONS

- AVP: for this document Automated Valet Parking Type 2
- AVP-capable car (vehicle): a passenger car equipped with the necessary equipment to fulfill AVP in designated AVP-capable parking lots. All AVP capable cars of a specific brand need to be registered in a central database maintained by the respective OEM
- AVP-capable parking spot (ISO), parking space (APDS): parking space for one car that is technologically equipped to perform AVP.
- AVP enabled facility: The building or area used for parking; it can consist of AVP operation zone and non-AVP parking areas.
- AVP operation zone: The geographical area inside an AVP enabled facility where automated driving can be performed.
- Parking service aggregator: an entity aggregating static and dynamic parking data and providing this to different stakeholders in the parking industry including end-consumer services.
- Parking Management System: A system which helps operators to manage their car park. Typically, they include payment services, Monitoring and enforcement, access control, and reporting.
- (AVP-) System provider (not defined in ISO): the company setting up the infrastructure in the respective AVP parking lot.
- AVP-service provider (ISO)/ service operator (parking): the company operating the AVP-capable parking lot. AVP-system operator: a role that can perform local activities in AVP system (incident management/ error handling/ vehicle rescue)
- User: a person allowed to use the AVP functions in an AVP-enabled car
- AVP-user account: A user account operated by the OEM or a trusted 3rd party account that defines the entity of the car user for identification in an AVP process.
- VAS: Value added services (i.e. electric charging, automated car wash, in-trunk delivery, etc.)
- OEM: Car manufacturer
- HMI: Human-Machine-Interface
- AVP infrastructure provider: Entity that erects the AVP technology in the AVP enabled facility.

3. USER STORY AVP₂ – PURELY USER PERSPECTIVE

3.1. Set-up

- A potential user is made aware of AVP functionality (including VAS) at initial contact with an AVP capable vehicle or with an AVP enabled facility (e.g. in a rental car). In the latter case, the HMI in the vehicle displays an adequate message.
- All AVP-capable cars are registered in a database of the respective OEM
- The potential user registers a user account. In the registration the respective OEM or an authorized third party (like a parking service aggregator) performs necessary authentication and credit verifications according to the OEM's specifications.
- The user adds the AVP-capable vehicle into his user account
- The user is ready to utilize the AVP functionalities of his/ her car

3.2. Before & While Driving

- The vehicle HMI, the OEM app, or the app of an authorized third party show a list of available AVP-capable parking lots with the available VAS to the specific car in use by user (information received by Parking Service Aggregators)
- User can search, select, reserve, and book a spot in any AVP-capable parking lot
- Reservations/bookings are sent to the AVP system directly or via the Parking Service Aggregator (e.g. Parkopedia, etc.) and depending on architecture routed to the parking management system too
- Optionally user gets an overview of available value-added-services such as EV-charging (which he can optionally book in advance)
- User can initiate the navigation to the target AVP-capable parking lot
- While enroute to the target AVP-capable parking lot the OEM may check the validity and readiness of the AVP-capable parking lot by the AVP service provider

3.3. Arriving (at target AVP-capable parking lot)

- User is being navigated to target AVP-capable parking lot and there specifically to the AVP drop-off zone
- Conventional signage on site will support the driver to find the designated AVP drop-off zone
- License plate detection
- Access permission inquiry/grant access or deny access to user (consideration of known vs. unknown users) > barrier opens, parking transaction starts

3.4. Start Transaction

- At AVP Drop-off zone user is prompted by HMI/ OEM App to leave the AVP-capable car, highlighting that no people or relevant belongings should be left behind in the AVP-capable car
- User confirms the hand-over request in HMI or App.
- OEM will confirm authentication of parking process request to the user and check the readiness of the vehicle (sufficient fuel level/battery charge level, sufficient user funds/ credit to perform AVP operations incl. VAS) and lock the car.
- OEM will check the validity and readiness of the AVP-capable parking lot by the AVP service provider and match location of AVP-capable car and location of the AVP-capable parking lot and prepare the car for the hand-over process to the AVP service provider.
- Checks are performed on multiple levels:
 - o General checks: do the general parameters match (size, etc.)
 - o Technical checks (enough fuel, brakes OK?)
 - o Ad-hoc checks: is an AVP spot available NOW?
- Once the integrity of the parking operation is verified the AVP-service provider is requesting the "Fahrbereitschaft" (deactivate immobilizer, engine start); additionally, all requested VAS are being re-confirmed (altered) to the AVP-service operator.
- AVP-service provider takes over the responsibility of car.

3.5. While Transaction

- AVP-system provider will maneuver the AVP-capable car to the designated parking spot.
- Options for parking scenarios are:
 - o before the gate (of parking facility)
 - o behind the initial gate (of parking facility)
 - mixed scenario
 - Carpark in a carpark

To do so the system may interface with local parking infrastructure like gates, automated EV-charging, car-wash infrastructure, etc.

- At any given point the user can request additional VAS (given their availability); user can cancel VAS that were booked but not yet performed.
- In any case, the user gets displayed (a) that the car is underway, (b) where the car is parked (parking spot no. and location) and (c) estimated pick-availability time.
- For added convenience and based on calendar-based events (like scheduled arrival of a plane) the car could be maneuvered to a staging area close to the pick-up zone prior to the actual pre-scheduled pick-up.

- All events are being tracked, timestamped, and recorded for tracking and billing purposes

3.6. Stop Transaction

- The AVP service provider offers the car back to the customer in the pick-up zone who, by opening (unlocking) the car (hence acknowledging the receipt of the car in the app) ends the parking process (AVP system provider will enable car to be driven away by user. User can unlock car, embark, and exit parking facility)
- AVP service provider also delivers a summary of all events being tracked for billing purposes to the owner of the billing relationship

3.7. Billing & Service Information

- The OEM or authorized service aggregator collects all billing relevant transaction data sets.
- Inside the user account user-specific billing rules might apply.
- The user is sent the invoice
- The payment provider is sent the payment info (and does the collection)
- All parties involved will be paid for their contribution

3.8. User Loyalty

- OEM might inform user through dedicated updates, communication, and marketing initiatives
- Agreement, that every party will explore this individually; outside scope of ERTICO platform

FOR REFERENCE/INFORMATION

Selected roles from ISO 23374-1

- *Service Provider: Role of an organization that receives / hands over authority (rights and ability to perform certain tasks on the SV) with users through AVPS*

Service provider is the main organization which manages all the necessary information in order to provide services to the user Through AVPS:

- a) Coordinate the entities involved in AVPS and provide service to user*
- b) Ensure that each sub-system fulfils the requirements stated in ISO and ensure that the cooperation of these sub-system will comply with the system requirements.*

- *user: individual service recipient that hands over authority (rights and ability to perform certain tasks on the SV) with users through AVPS*

- *SV: subject vehicle*

- *Parking facility: public or private car park capable of AVPS*

- *System operator: the role of an organization which manages vehicle operation in the parking facility. This involves tasks which are either monitored while being performed or performed manually by individuals from a remote location. The role interacts with AVPS through the OB sub-system*

- a) Dispatch the SV into driverless operation either manually or automatically*
- b) Perform remote assistance when requested by AVPS*
- c) Having the capability to terminate system operation when deemed necessary*

- *Facility manager: the role of an organization which includes tasks to be performed by individuals requiring physical access to objects and events within the facility:*

- a) Maintain the environment in the parking facility*
- b) React upon incapacitation of the automated vehicle operation*
- c) Check the SV is equipped with external attachments which do not conform to the parking facilities properties*
- d) assist handover of the authority and efficient start of automated vehicle operation*

